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(12) (19) (CA) **Demande-Application**

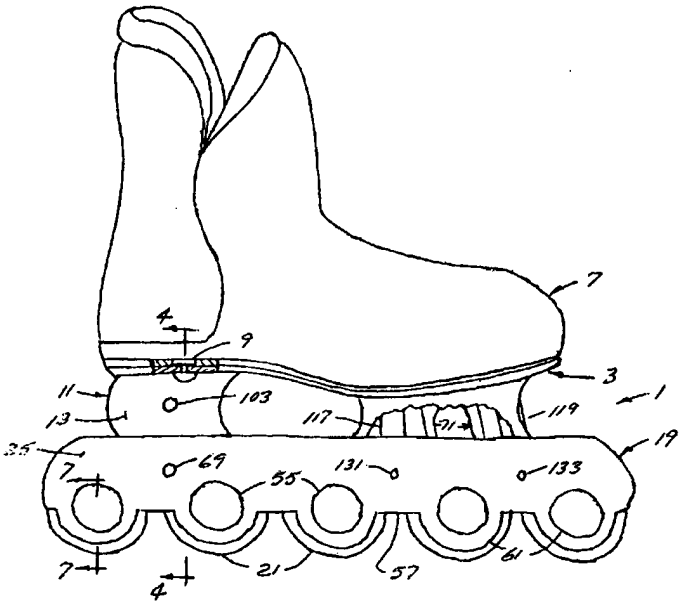
(21) (A1) **2,201,814**
(22) 1997/04/04
(43) 1998/10/04

(72) CHICOINE, Richard, CA
(71) CHICOINE, Richard, CA

(51) Int.Cl.[6] A63C 17/00, A63C 17/22

(54) **DISPOSITIF DE MONTAGE DES ROUES POUR PATINS A ROUES ALIGNEES**

(54) **WHEEL SUPPORT FOR IN-LINE SKATES**



(57) La présente invention vise un dispositif de montage des roues pour patins à roues alignées, composé d'un élément formant semelle et d'un cadre allongé fixé sous la semelle en vue de recevoir les roues. Le dispositif de montage des roues permet la fixation des roues dans l'axe du cadre porteur. Un élément à pivot relie par une rotule les segments arrière de l'élément semelle et du cadre porteur des roues. Des guides asservis les uns aux autres à la partie avant de l'élément formant semelle et du cadre porteur de roues dirigent la partie avant du cadre porteur lors des mouvements vers le haut ou vers le bas par rapport à la position de l'élément semelle. Un ressort résilient monté entre l'élément semelle et le cadre porteur de roues éloigne la partie avant du cadre de la partie avant de l'élément formant semelle afin de prolonger le contact entre les roues et le sol, pendant le patinage.

(57) A wheel mounting assembly for an in-line skate comprising a sole member and an elongated wheel frame beneath the sole member. Wheel mounting members mount wheels in-line in the frame. A pivot member pivotally connects the rear portions of the sole member and the wheel frame together. Cooperating guide members on the front portions of the sole member and the wheel frame guide the front portion of the wheel frame for up and down movement relative to the sole member. A resilient spring between the sole member and the wheel frame biases the front portion of the wheel frame away from the front portion of the sole member to ensure longer contact between the wheels and the ground when skating.

ABSTRACT

A wheel mounting assembly for an in-line skate comprising a sole member and an elongated wheel frame beneath the sole member. Wheel mounting members mount wheels in-line in the frame. A pivot member pivotally connects the rear portions of the sole member and the wheel frame together. Cooperating guide members on the front portions of the sole member and the wheel frame guide the front portion of the wheel frame for up and down movement relative to the sole member. A resilient spring between the sole member and the wheel frame biases the front portion of the wheel frame away from the front portion of the sole member to ensure longer contact between the wheels and the ground when skating.

WHEEL SUPPORT FOR IN-LINE SKATES

FIELD OF THE INVENTION

This invention is directed toward an improved wheel mounting assembly for in-line skates.

The invention is also directed toward a suspension for the wheels of an in-line skate.

BACKGROUND ART

Known in-line skates normally have the wheel mounting assembly fixed to the skate boot. There are disadvantages in this. As the skater pushes off the ground with each skate during skating, the wheels of the skate are also lifted. As the wheels leave the ground, skating efficiency is reduced. Also, with the wheel mounting assembly fixed to the skate boot, the skate cannot damp out the bumps encountered during skating resulting in a rough ride. No in-line skates are known that cushion the ride either by cushioning the wheel support assembly or by cushioning the wheels individually.

SUMMARY OF THE INVENTION

It is the purpose of the present invention to provide an improved in-line skate that is more efficient than known in-line skates. It is another purpose of the present invention to provide an improved in-line skate that cushions the ride. In one embodiment of the present invention, the ride of the in-line skate is improved by cushioning the wheel support assembly of the skate. in another embodiment of the present invention, the ride of the in-line skate is improved by cushioning each wheel in the in-line skate.

The efficiency of the in-liner skate of the present invention is improved by providing a wheel support assembly with biasing means to bias the front portion of the wheel frame in the support assembly toward the ground. As a result, as a skater pushes off the ground at the end of a stride with the skate during skating, the biasing means will maintain at least the front wheels of the skate,

carried by the wheel frame, in contact with the ground for a slightly longer period of time, than a skate without biasing means. This provides extra rolling and thus greater efficiency for the same expenditure of energy.

The ride on the in-line skate of the present invention is improved, in one embodiment, by mounting at least the front portion of the wheel frame, carrying the wheels, to the skate with shock absorbing means. The shock absorbing means damp out many of the bumps encountered by the wheels before they reach the skater's feet. In another embodiment, the ride is improved by providing shock absorbing means for each wheel mounted in the wheel frame.

In a preferred embodiment of the present invention the improved in-line skate can combine the biasing feature with either of the shock absorbing features to provide a skate that is both more efficient and better riding.

In accordance with the present invention, biasing means, in the form of a spring located between a sole member on the skate and a wheel frame, bias the front portion of the wheel frame away from the sole member. this biasing action causes the front wheels of the skate to remain in contact with the ground for a slightly longer period of time as the skate is lifted during push off while skating, thus improving efficiency.

In accordance with another embodiment of the present invention, an in-line skate is provided having a wheel frame that is pivotally mounted at its rear portion to a sole member in a skate boot. Cooperating guide means guide the front portion the front portion of the wheel frame for vertical movement relative to the sole member. shock absorbing means are provided on the skate between the front portions of the of the sole member and the wheel frame, adjacent the guide means, to cushion the ride.

In accordance with another a further embodiment of the present invention, an in-line skate is provided having a wheel frame and a

pair of mounting blocks for each wheel mounted for vertical movement on the wheel frame. spring means cushion the vertical movement of each pair of blocks to cushion the ride of the skate.

The invention is particularly directed toward a wheel mounting assembly for an in-line skate having a sole member and an elongated wheel frame. Means are provided for mounting wheels in-line in the wheel frame. Pivot means pivotally connect the rear portions of a sole member and the wheel frame together. cooperating guide means on the front portions of the sole member and the wheel frame guide the front portion of the wheel frame for up and down movement relative to the sole member. Resilient biasing means between the sole member and the wheel frame bias the front portion of the wheel frame away from the front portion of the sole member to ensure longer contact between the wheels and the ground when skating.

The invention is also particularly directed toward a wheel mounting assembly for an in-line skate having a sole member and an elongated wheel frame. Means are provided for mounting wheels in-line in the wheel frame. Pivot means pivotally connect the rear portions of a sole member and the wheel frame together. cooperating guide means on the front portions of the sole member and the wheel frame guide the front portion of the wheel frame for up and down movement relative to the sole member. Shock absorbing means are mounted between the front portions of the sole member and the wheel frame, adjacent the guide means, to provide a smoother ride.

The invention is also particularly directed toward a suspension for the wheels of an in-line skate, the suspension having a wheel frame with side walls between which the wheels are mounted in-line. Wheel mounting openings are provided in the side walls, longitudinally spaced apart. Mounting blocks are mounted in the openings for limited vertical movement. Axle means are provided for mounting each wheel on each pair of opposed mounting blocks. Spring means cushion the vertical movement of the mounting blocks in the openings in the wheel frame.

BRIEF DESCRIPTION OF THE FIGURES IN THE DRAWINGS

Fig. 1 is a side view, in partial section, of an in-line skate;

Fig. 2 is a perspective view, in partial section, of the sole member carrying the biasing means and shock absorbing means;

Fig. 3 is a perspective view of the wheel frame;

Fig. 4 is a cross-section view taken along line 4-4 in Fig. 1;

Fig. 5 is a partial longitudinal, cross-sectional view of the lower portion of the skate;

Fig. 6 is a cross-section view taken along line 6-6 in Fig. 5;

Fig. 7 is a cross-section, exploded view taken along line 7-7 in Fig. 1;

Fig. 8 is a side view, in partial section, of a skate boot showing other types of guide means and biasing means;

Fig. 9 is a detail side view, in section, showing another type of guide means;

Fig. 10 is an exploded, perspective view of another form of wheel mounting;

Fig. 11 is a longitudinal cross-section view of a wheel mounting block, shown in Fig. 10, mounted in an opening;

Fig. 12 is a cross-section view taken along line 12-12 in Fig. 11;

Fig. 13 is a perspective exploded view showing another type of wheel mounting block; and

Fig. 14 is a view similar to Fig. 12 showing the block of Fig. 13 mounted in the opening.

DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

The wheel mounting assembly 1 of the present invention, for an in-line skate, as shown in Figs. 1 to 3, has a rigid sole member 3. The sole member 3 is a separate, molded, plastic plate 5 that is adapted to be fixed to the sole of a skate boot 7 by suitable front and rear fastening means 9. the sole member could, in an alternative construction if the skate boot itself is molded, form

the sole of the boot and be an integral part of the boot. The sole plate 3 has a rear mounting bracket 11 extending downwardly from its rear portion, the bracket terminating in a pair of laterally spaced-apart, downwardly extending, parallel side walls 13, 15.

The wheel mounting assembly 1 includes a wheel frame 19 for holding the wheels 21 of the skate in-line. The wheel frame 19 is in the shape of an elongated, inverted channel having a top wall 23 and parallel side walls 25, 27 extending down from the sides of the top wall 23 as shown in Fig. 3. A rear opening 29 of generally rectangular shape is provided in the rear portion of the top wall 23 and two longitudinally spaced-apart front openings 31, 33, each of generally rectangular shape, are provided in the front portion of the top wall 23. The front openings 31, 33 are separated by a cross-bar 35 extending between the side walls 25, 27 of the wheel frame.

A pair of narrow, rear mounting slots 39, 41 are provided in the top wall 23 of the wheel frame, one on either side of the rear opening 29 and adjacent the side walls 25, 27. Two pair of narrow, front, guide slots 43, 45 and 47, 49 are provided in the top wall 23 adjacent the front openings 31, 33 respectively. Both pairs of slots 43, 45 and 47, 49 are adjacent the side walls 25, 27.

The side walls 25, 27 of the wheel frame 19 are formed with longitudinally spaced apart axle openings 51, 53 for receiving the axles 55 on which the wheels 21 are mounted as will be described. The axle openings 51 in the sidewall 25 oppose the axle openings 53 in the sidewall 27. The lower edges 57, 59 of the side walls 25, 27 have downwardly extending ears 61, 63 under the axle openings 51, 53 providing wheel covers.

The wheel frame 19 can be formed from a sheet of suitable material, such as metal, which sheet is stamped to shape, along with stamping out the top wall openings 29, 31, 33; the top wall slots 39 to 49; and the side wall axle openings 51, 53. The stamped sheet is then bent to the inverted channel shape. Alternatively,

the wheel frame can be molded from suitable plastic material.

The sole member 3 and the wheel frame 19 are pivotally connected at their rear portions to form the major portion of the wheel mounting assembly 1. The side walls 13, 15 of the bracket 11 on the sole member are passed through the rear mounting slots 39, 41 in the top wall 23 of the wheel frame 19 as shown in Fig. 4. Holes 63 in the lower portion of the bracket side walls 13, 15 are horizontally aligned with holes 65 in the side walls 25, 27 of the wheel frame 19 and a pivot pin 67 is passed through the aligned holes 63, 65 to pivotally connect the sole member 3 and the wheel frame 19 together. The pin 67 extends transversely to the longitudinal axis of the mounting 1. Suitable fasteners 69 can be axially threaded into the ends of the pivot pin 67 to hold it in place between the side walls 25, 27.

Cooperating guide means 71, 73 are provided in the front portions of the sole member 3 and the wheel frame 19 to guide wheel frame 19 in its pivotal movement relative to the sole member 3. The guide means 71 on the sole member 3 comprise plate-like guide members extending down from the sides of the sole member 3 in its front portion. The guide members are preferably in the form of longitudinally spaced-apart, parallel, legs 75, 77 and 79, 81 on each side of the sole member 3. The guide means 73 on the wheel frame 19 comprise the two pair of front guide slots 43, 45 and 47, 49. The legs 75, 77 slide through the slots 43, 47 and the legs 79, 81 slide through the slots 45, 49 as shown in Fig. 5. The legs 75, 77 and 79, 81 straddle the wheels 21 as shown in Fig. 6.

Preferably, retaining means are provided to prevent separation of the front portion of the wheel frame 19 from the front portion of the sole member 3. The retaining means can comprise retaining bars 83, 85 fastened to the bottom of the legs 75, 77 and 79, 81 respectively by suitable fastening means 87 after the legs are mounted in the slots. The cross bar 35 interferes with retaining bars 83, 85 to prevent separation of the wheel frame 19 from the

sole member 3.

The wheel mounting assembly 1 includes biasing means for biasing the front portion of the wheel frame 19 downwardly from the sole member 3, as the skater pushes or drives off the skate, so as to have the front wheels of the skate remain in contact with the ground for a slightly longer period of time during skating. The biasing means, shown in Figs. 1, 2 and 4 comprises a coil spring 91 having a coil 93 with extended ends 95, 97. The ends 95, 97 of the spring extend in the same general direction and diverge. The coil 93 of the spring 91 is loosely mounted on a pin 101 that is mounted between the side walls 13, 15 of the sole member 3. The spring mounting pin 101 is located above the pivot pin 67 connecting the sole member 3 to the wheel frame 19 and is parallel to it. The mounting pin 101 is held in place by screws 103, 105 threaded axially into the ends of pin 101 through aligned holes (not shown) in the walls 13, 15. The pin 101 maintains the spring 91 in position. The top, extended end 95 of the spring 91 is mounted in a rearwardly opening longitudinal extending bore 111 (shown in dotted lines) formed in the bottom of the sole plate 5 in front of the walls 13, 15. The bottom extended end 97 of the spring 91 is mounted in a tubular-like holder 113 formed in the top wall 23 of the wheel frame 19. The holder 113 extends longitudinally. The spring 91 biases the wheel frame 19 about the pivot pin 67 away from the sole member 3.

Shock absorbing means are mounted between the front portions of the pivotally connected sole member 3 and wheel frame 19. The shock absorbing means can, as shown in Figs. 1 and 2 comprise a pair of springs 117, 119 mounted just in front of, and just behind, the cooperating guide means 71, 73. Each spring 117, 119 has top and bottom mounting brackets 121, 123 as shown in Figs. 5 and 6. The top brackets 121 of each spring 117, 119 are pivotally mounted by pins 123 between pairs of mounting brackets 127 on the bottom of the sole member 3 in front and behind the guide means 71, 73. The

bottom brackets 123 of each spring 117, 119 are pivotally mounted by pins 131, 133 mounted between the side walls 25, 27 of the wheel frame 19. The springs 117, 119 pass through the two front openings 31, 33 respectively in the top wall 23 of the wheel frame 19 and are located longitudinally between the wheels. The springs 117, 119 cushion the movement between the front portions of the sole member 3 and the wheel frame 19 to absorb shocks taken by the wheels 21 carried by the wheel frame 19. The springs can be sized to suit the weight of the rider, being stiffer for heavier people. The springs can be easily changed if needed, for example if the skates are sold by the user to a person who weighs substantially less than the user and therefore needs softer springs.

The wheels 21 of the skate are mounted in the wheel frame 19 between the side walls 25, 27 by axles 55 as shown in Fig. &. Each axle 55 is preferably a split axle having two parts 133, 135 with each part 133, 135 having a tubular body 137, 139 and an outer end wall 141, 143 on one end of the body slightly larger in diameter than the diameter of the tubular body 137, 139. The inner ends 145 of one of the bodies 137 is reduced in diameter to fit within the inner end 147 of the other body 139. The ends 145, 147 detachably connect together with a slot and bayonet connection (not shown). When the parts 133, 135 are connected together by passing the bodies 137, 139 of the parts through the holes 51, 53 in the side walls 25, 27 and connecting their inner ends together, they form a rigid axle 55 on which a wheel is mounted between the side walls of the wheel frame as shown in Fig. 4. The end walls 141, 143 are too large to pass through the openings 51, 53 and retain the axle in place.

In use, the wheel mounting assembly 1 carries the wheels 21 in-line and maintains the front wheels in contact with the road surface, through the biasing means, for a longer period of time when skating so as to improve skating efficiency. The wheels are maintained in contact for a longer period of time due to the action

of the spring 91 pivoting the wheel frame 19 toward the ground as the skater is lifting his foot on pushing off the ground. When the wheels stay in contact with the ground for a longer period of time there is additional rolling action for the energy expended making skating more efficient. When the skate makes contact again with the ground, the weight of the skater pivots the wheel frame 19 against the biasing spring 91 toward the sole member 3. The shock absorbing springs 117, 119 cushion any bumps and are designed to allow the biasing spring 91 to pivot the front of the wheel frame about one half inch away from the front of the sole member during push off.

While on form of cooperating guide means 71, 73 has been described, other types of guide means could be used. For example, as shown in Fig. 8, the guide means 71' could comprise a pair of bars 151, 153 that are mounted in tandem between the sole member 3' and the wheel frame 19'. The front bar 151 is pivotally attached at its upper end, via a pivot pin 155, to a bracket 157 on the bottom of the sole member and extends down and forward to be pivotally attached, via a longitudinal slot 159 to a pivot pin 161 mounted between the side walls of the wheel frame 19'. The rear bar 153 is pivotally attached at its upper, via a pivot pin 165 to a bracket 167 on the bottom of the sole member. The rear arm 153 extends downwardly and rearwardly to be attached, via a longitudinal slot 169 to a pivot pin 171 extending between the side walls. The bars 151, 153 pass through a large front opening 173 in the top wall of the wheel frame.

Shock absorber means, in the form of one or two side-by-side coil springs 177 are pivotally connected between the sole plate and the wheel frame. The shock absorbing means are mounted between the bars 151, 153 and also pass through the opening 173. The springs cushion the ride, the upper ends of the slots 159, 169 in the bars 151, 153 limiting the cushioning action. The lower ends of the slots 159, 169 limit the pivoting action of the wheel frame 19'

away from the sole member 3'.

The biasing means, in another embodiment as shown in Fig. 8, can comprise a flat spring 176 bent in the shape of a U with the bend 177 adjacent the rear of the skate, one arm 178 adjacent the bottom of the sole member 3' and the other arm 179 adjacent the top wall of the wheel frame 19'. The top arm 178 is preferably embedded in the sole member 3'.

In another embodiment, the guide means 71" can comprise a u-shaped member 181, as shown in Fig. 9, on each side of the sole member 3". Each member has its arms 183, 185 passed upwardly through guide slots 187, 189 in the top wall 23" of the wheel frame 19" and fastened with suitable means (not shown) to the sole member 3". The lower portion 191 of the member 181 is necked in to form an upwardly opening slot 193. A guide pin 195 on the inner side of the side wall 25" of the wheel frame rests in the slot 193. A head 197 on the pin 195 retains the member 181 on the pin 195. The pin and slot guide the wheel frame relative to the sole member. If desired, shock absorbing springs 201, 203 can be mounted over the arms 183, 185 of the member, between the top wall 23" and the sole member 3" to provide cushioning.

While one form of wheel mounting, using a split-axle, has been described, other forms of wheel mountings can be used. In one embodiment of this invention, the wheels can be mounted on the wheel frame using novel independent suspension means. The novel suspension means 301 for each wheel 303, as shown in Figs. 10 to 12, include axle blocks 305 for receiving the axles 307 of the wheels. Opposed rectangular openings 311, 313 are provided in the side walls 315, 317 of the wheel frame 318 for receiving the axle blocks, there being one axle block in each opening. Mounting means are provided for mounting an axle block 305 in each opening 311, 313 for vertical movement within the opening. The mounting means can comprise a pair of top guide pins 319, 321 mounted in the top of the block 305 in holes 322, 323 and extending upwardly in the

opening 311 into top guide holes 324, 325 in the top wall 327 defining the opening 311. A bottom guide pin 329 extends downwardly from the bottom of the block 305 into a bottom guide hole 331 in the bottom wall 333 defining the opening. The bottom guide hole 331 is a through hole and the bottom guide pin 329 is threaded into the axle block 305 through the bottom guide hole. A slot for a screwdriver is provided in the bottom of the bottom guide pin 329.

The block 305 is shorter than the opening 311 and is mounted in the opening with the top guide pins 319, 321 screwed down into the holes 322, 323 in the block 305 to provide clearance. Compression springs 337, 339 are mounted on the top guide pins 319, 321. With the block 305 in place, the top guide pins are rotated by a screwdriver through the top guide holes 324, 325 to elevate and enter the holes 324, 325 to guide the block. The springs 337, 339 cushion the upward movement of the block within the opening. A wheel 303 is rotatably mounted between the sidewalls 315, 317 and the opposed blocks 305 in the sidewalls by an axle 307. The axle 307 passes through central holes 347 in the blocks 305 and through a central opening in the wheel 303 and are connected together within the wheel. The wheel rotates on the axle and is cushioned by the movement of the blocks in the openings carrying the wheel.

Each block 305' can be made in two parts, an outer part 355 and an inner part 357 as shown in figs. 13 and 14. The outer part 355 has a main body part 361 with outer wings 363 extending from each end 365 of the main body part 361 along the outside of the body. The inner part 357 has parallel top and bottom flanges 369, 371 joined by a side wall 373. The side wall 373 extends past the ends of the flanges forming inner wings 375. The main body part 361 of the outer block part 355 is mounted within the flanges 369, 371 of the inner block part 357 within the opening 311.

Aligned holes 375, 377 in the upper flange 369 and the main body part 361 respectively, cooperate with the upper guide holes

379, 381 in the wheel frame 383 to receive the upper guide pins 385, 387. Aligned holes 389, 391 in the main body part 361 and the lower flange 371 cooperate with the lower guide hole 393 in the wheel frame 383 to receive the lower guide pin 395. Aligned holes 399, 401 in the main body part 361, and the sidewall 373 form the axle hole which is transverse to the guide holes. The main body part 361 and the flanges 369, 371 are just slightly shorter than the length of the opening 403 in the side wall 405 of the wheel frame 383. The outer and inner wings 363, 375 on the assembled block abut on the side wall 405 retaining the assembled block 305' in place. The mounting block 305', carrying a wheel, moves up in the opening 403 to compress the springs 409 on the pins 385, 387 when bumps are encountered.

CLAIMS:

1. A wheel mounting assembly for an in-line skate comprising: a sole member; an elongated wheel frame beneath the sole member; wheel mounting means for mounting wheels in-line in the frame; pivot means pivotally connecting the rear portions of the sole member and the wheel frame together; cooperating guide means on the front portions of the sole member and the wheel frame for guiding the front portion of the wheel frame for up and down movement relative to the sole member; and resilient biasing means between the sole member and the wheel frame for biasing the front portion of the wheel frame away from the front portion of the sole member to ensure longer contact between the wheels and the ground when skating.

2. A wheel mounting assembly as claimed in claim 1 wherein the sole member forms an integral bottom part of a skate boot.

3. A wheel mounting assembly as claimed in claim 1 including means for connecting the sole member to the bottom of a skate boot.

4. A wheel mounting assembly as claimed in claim 1 including shock absorbing means mounted between the sole member and the wheel frame adjacent the guide means.

5. a wheel mounting assembly as claimed in claim 4 where there are two shock absorbers, one in front of and the other behind the guide means.

6. A wheel mounting assembly as claimed in claim 5 wherein each shock absorber comprises a coil spring with means at each end of the spring for pivotally connecting it to both the sole member and the wheel frame, the pivot axis being transverse to the longitudinal axis of the sole member and the wheel frame.

7. A wheel mounting assembly as claimed in claim 1 wherein the cooperating guide means comprise a pair of parallel plates projecting downwardly from the bottom of the sole member, adjacent its sides, the plates generally parallel to the longitudinal axis of the sole member; and slots in the wheel frame for receiving the plates to guide the wheel frame for movement along the plates.

8. A wheel mounting assembly as claimed in claim 7 wherein the wheel frame comprises an inverted channel having a top wall and side walls, the guide slots formed in the top wall adjacent the guide slots.

9. A wheel mounting assembly as claimed in claim 8 wherein each plate is divided into two legs and there is a slot for each leg in the top wall, the slots separated by a cross bar and a retaining bar fastened to the bottom of each leg to prevent withdrawal of the legs from the slots.

10. A wheel mounting assembly as claimed in claim 1 wherein the guide means comprise a pair of slotted bars, the main plane of the bars generally parallel to the longitudinal axii of the sole member and the wheel frame, and pivot means for pivotally mounting each bar at its ends to the sole member and wheel frame, one of the pivot means located in the slot in the bars permitting movement of the wheel frame relative to the sole member.

11. A wheel mounting assembly as claimed in claim 10 wherein the slotted bars are longitudinally spaced apart and normally slope upwardly toward each other and the shock absorbing means are located between the bars and mounted on the sole member and wheel frame.

12. A wheel mounting assembly as claimed in claim 1 wherein the

guide means comprise a u-shaped member extending down from each side of the sole member, the lower end of the member deformed inwardly to form a vertical guide slot and a guide pin on the wheel frame within the slot.

13. A wheel mounting assembly as claimed in claim 12 including spring means on the upper portion of the member above the slot, the spring means adapted to be compressed between the sole member and the wheel frame to absorb shocks.

14. A wheel mounting assembly as claimed in claim 1 wherein the biasing means comprises a coil spring with two long ends, one long end inserted forwardly into a rearward facing blind hole on the bottom of the sole member, the other long end inserted forwardly into longitudinal extending holding means on top of the wheel frame.

15. A wheel mounting assembly as claimed in claim 14 including a mounting pin extending through the coil spring to mount it to the sole member.

16. A wheel mounting assembly as claimed in claim 1 wherein the biasing means comprises a u-shaped spring having one arm extending forwardly and against the bottom of the sole member and the other arm extending forwardly and against the top of the wheel frame.

17. A wheel mounting assembly as claimed in claim 1 wherein the wheel mounting means comprises independent spring suspension means wheel, the suspension means comprising opposed axle blocks slidably mounted for vertical movement in opposed openings in the wheel frame and spring means for resisting the vertical movement and an axle mounting the wheel between the blocks.

18. A wheel mounting assembly for an in-line skate comprising: a sole member; an elongated wheel frame beneath the sole member; wheel mounting means for mounting wheels in-line in the frame; pivot means pivotally connecting the rear portions of the sole member and the wheel frame together; cooperating guide means on the front portions of the sole member and the wheel frame for guiding the front portion of the wheel frame for up and down movement relative to the sole member; and shock absorbing means between the sole member and the wheel frame and adjacent the guide means for cushioning movement of the wheel frame relative to the sole member.

19. A wheel mounting assembly as claimed in claim 18 wherein the cooperating guide means comprise a pair of parallel plates projecting downwardly from the bottom of the sole member, adjacent its sides, the plates generally parallel to the longitudinal axis of the sole member; and slots in the wheel frame for receiving the plates to guide the wheel frame for movement along the plates.

20. A wheel mounting assembly as claimed in claim 18 wherein the guide means comprise a pair of slotted bars, the main plane of the bars generally parallel to the longitudinal axii of the sole member and the wheel frame, and pivot means for pivotally mounting each bar at its ends to the sole member and wheel frame, one of the pivot means located in the slot in the bars permitting movement of the wheel frame relative to the sole member.

21. A wheel mounting assembly as claimed in claim 18 wherein the guide means comprise a u-shaped member extending down from each side of the sole member, the lower end of the member deformed inwardly to form a vertical guide slot and a guide pin on the wheel frame within the slot.

22. A wheel mounting assembly for an in-line skate comprising a

wheel frame having side walls and a top wall; longitudinally spaced apart opposed openings in the side walls; an axle block mounted in each opening for vertical movement; spring means for resisting vertical movement of the blocks; and axle means for mounting a wheel between each pair of opposed blocks.

23. A wheel mounting assembly as claimed in claim 22 wherein each axle block is made in two pieces.

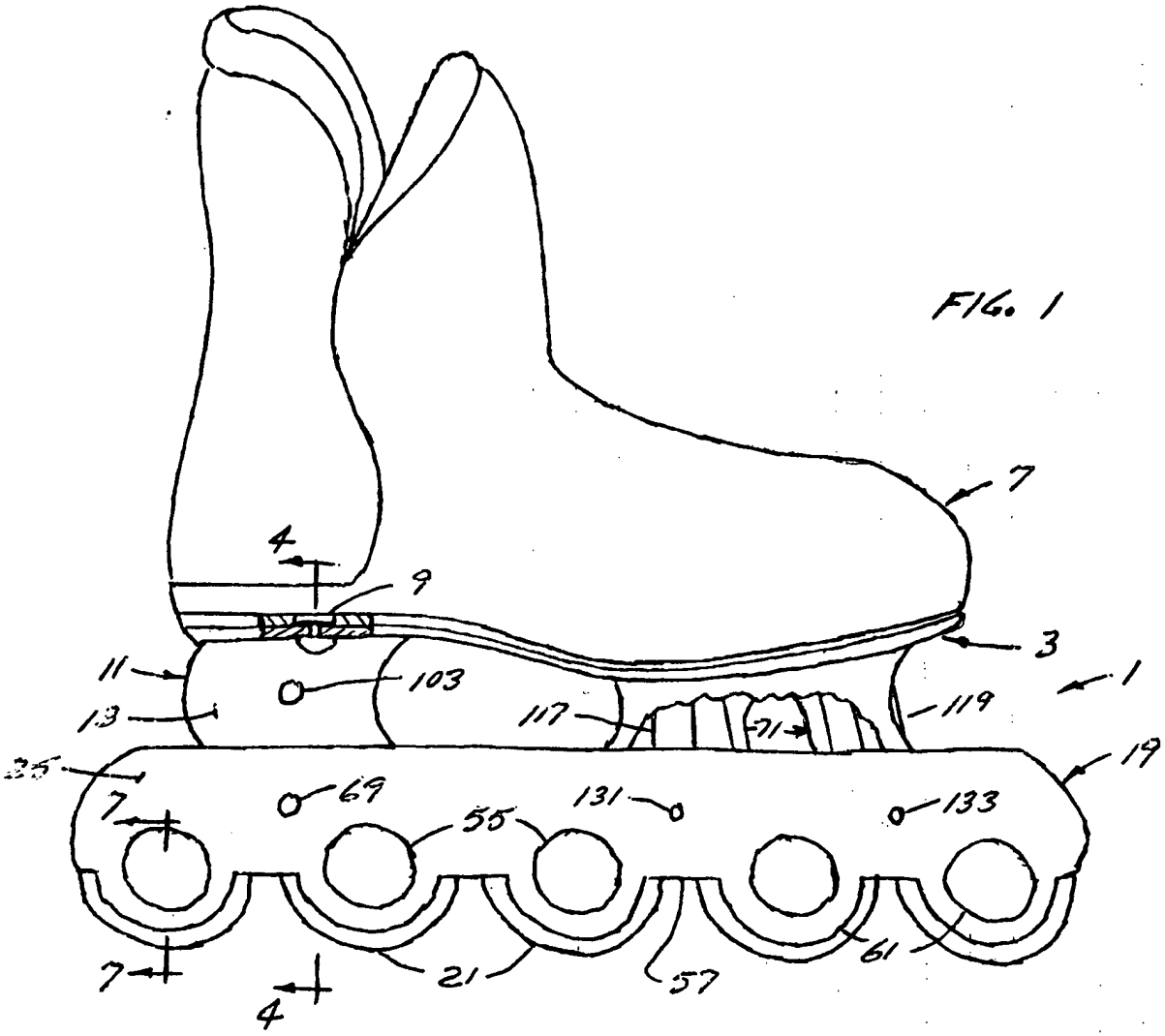


FIG. 1

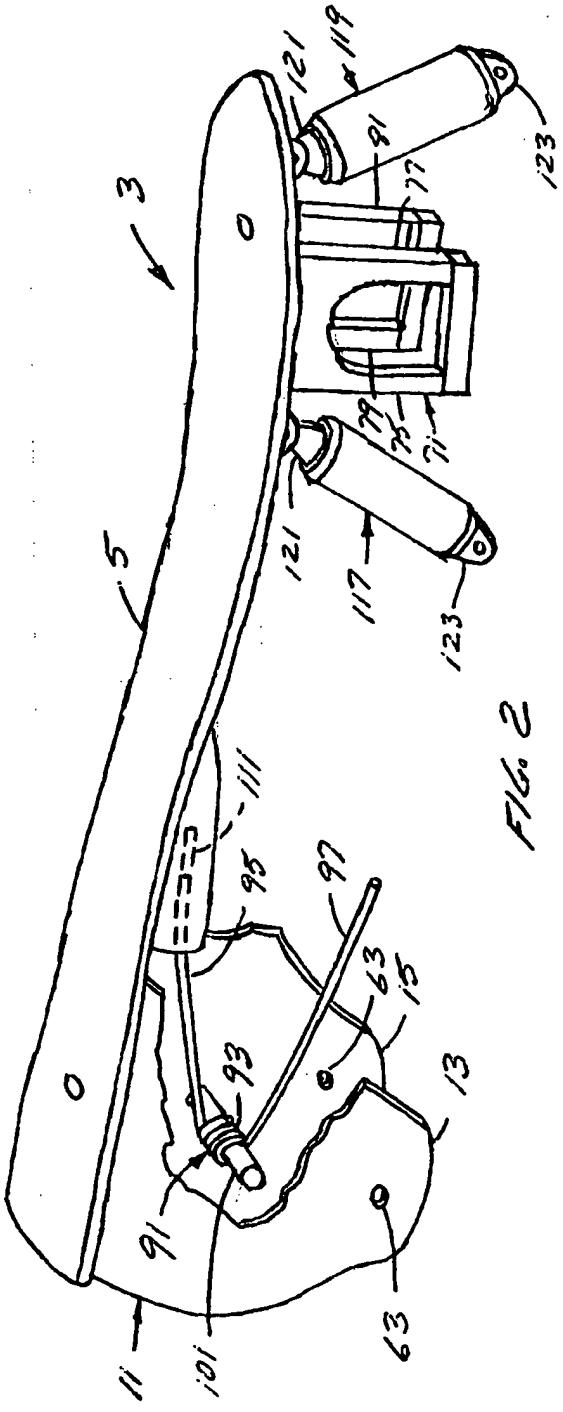


FIG. 2

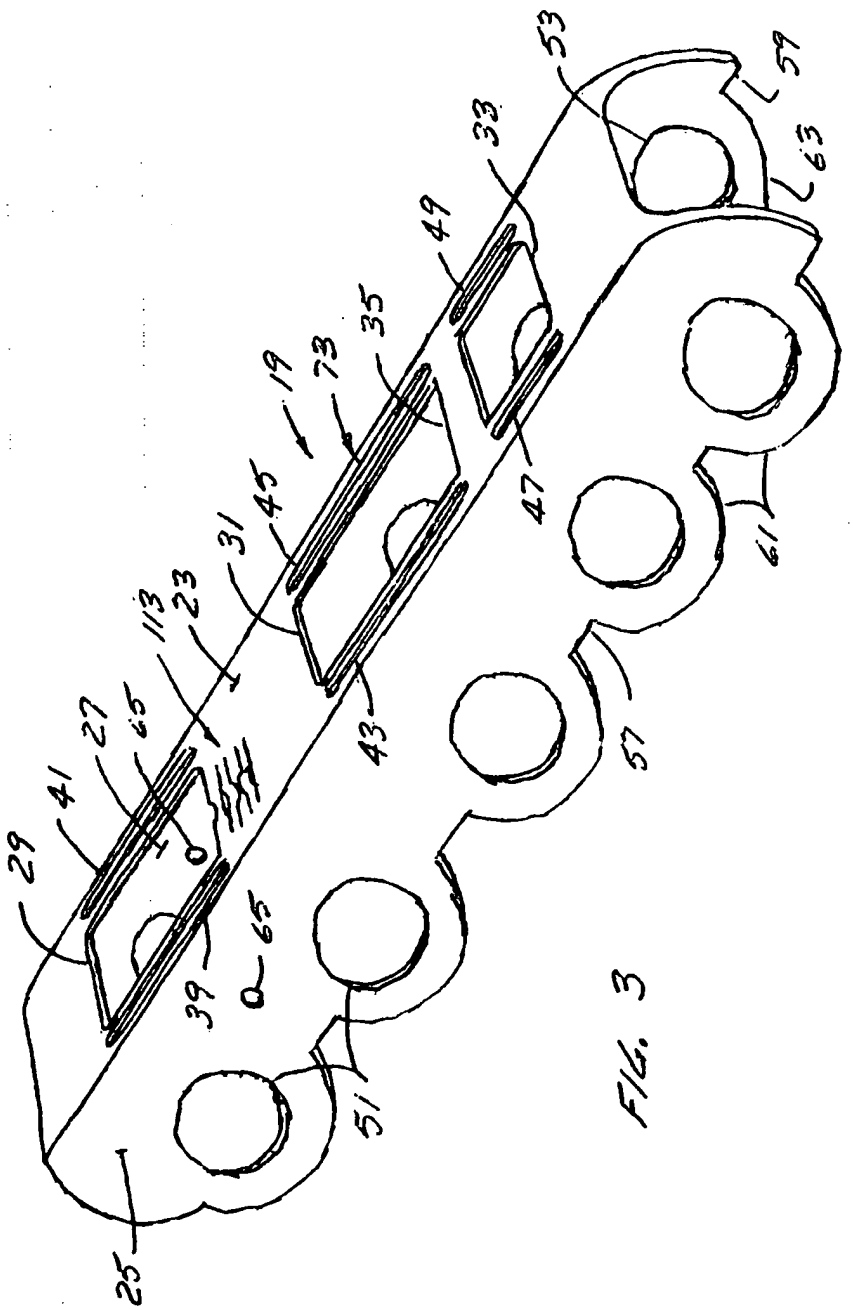
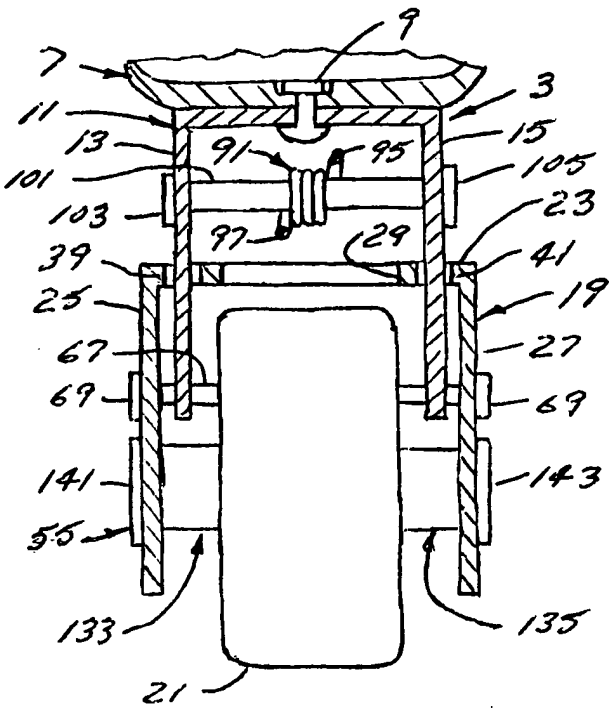


FIG. 3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21

FIG. 4

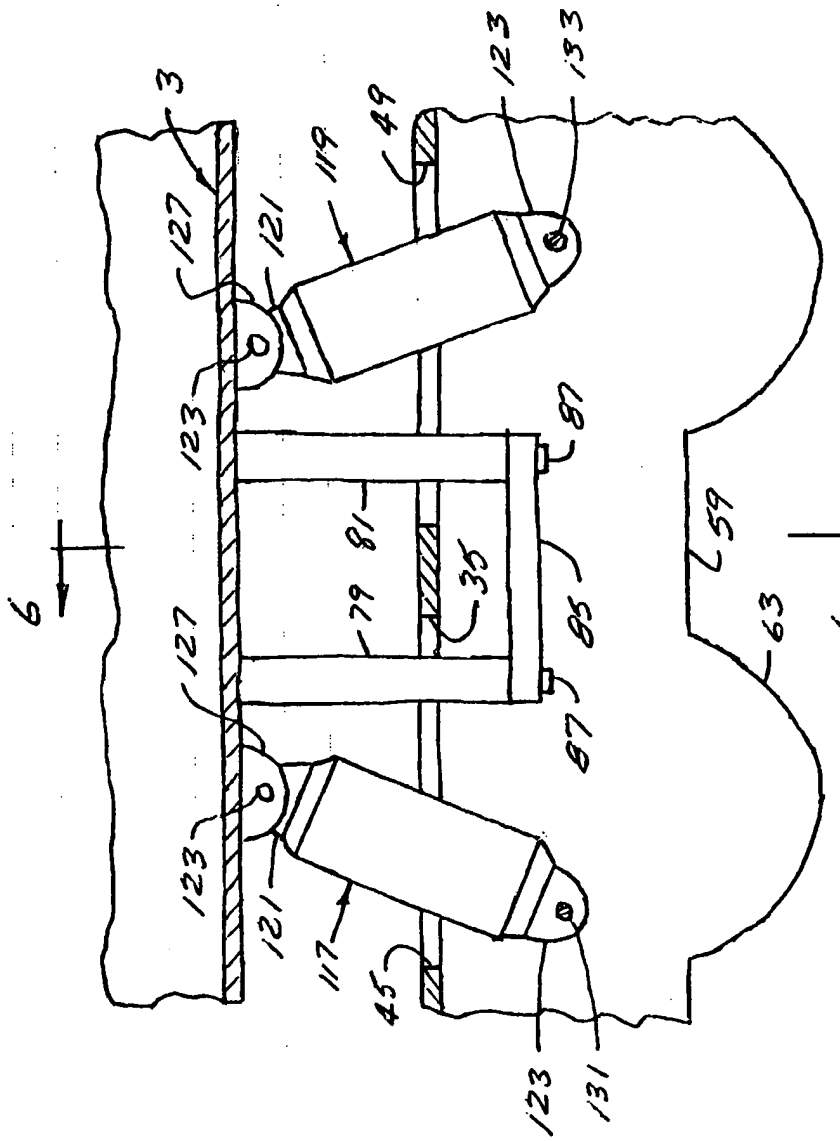

3
127
121
119
49
123
133
123
80
81
79
35
85
87
127
123
121
117
45
123
131
59
63
6
6

FIG. 5

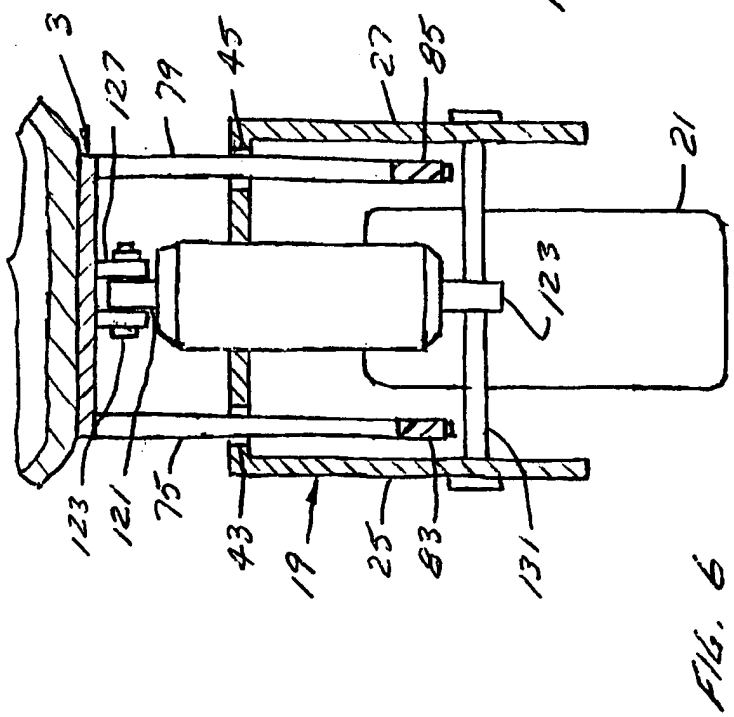

3
127
79
45
27
85
21
123
123
121
75
43
19
25
83
131

FIG. 6

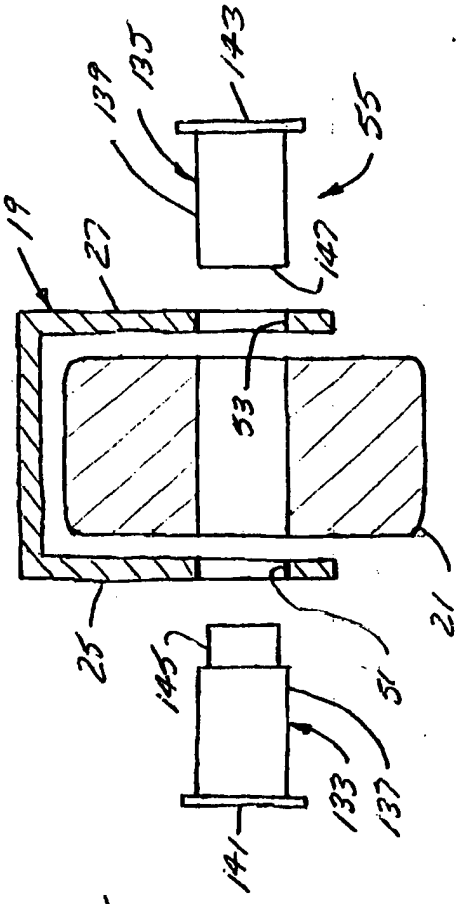

143
139
135
55
19
27
147
53
21
25
145
51
133
137
141

FIG. 7

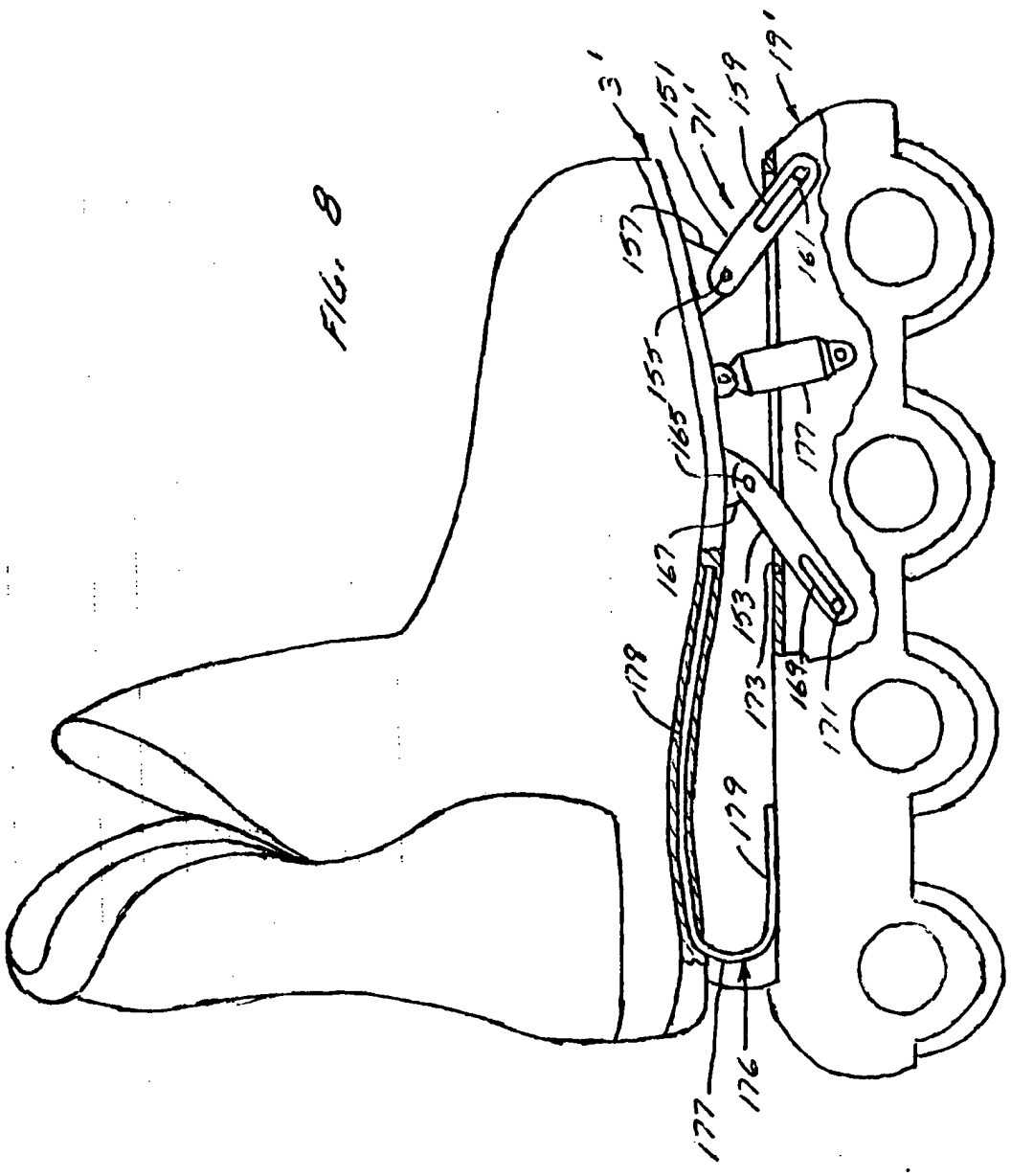

3'
151'
21'
159
19'
157
161
165
155
177
167
153
169
171
173
178
179
176
177

FIG. 8

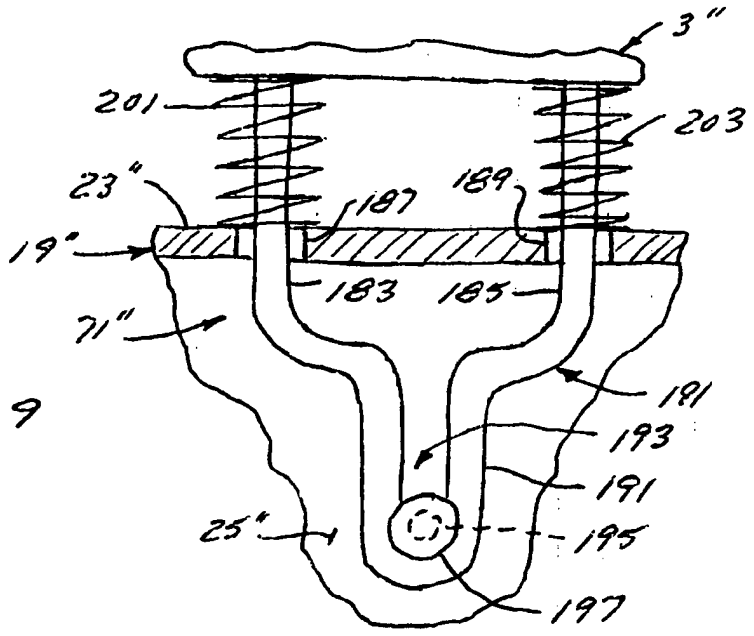


FIG. 9

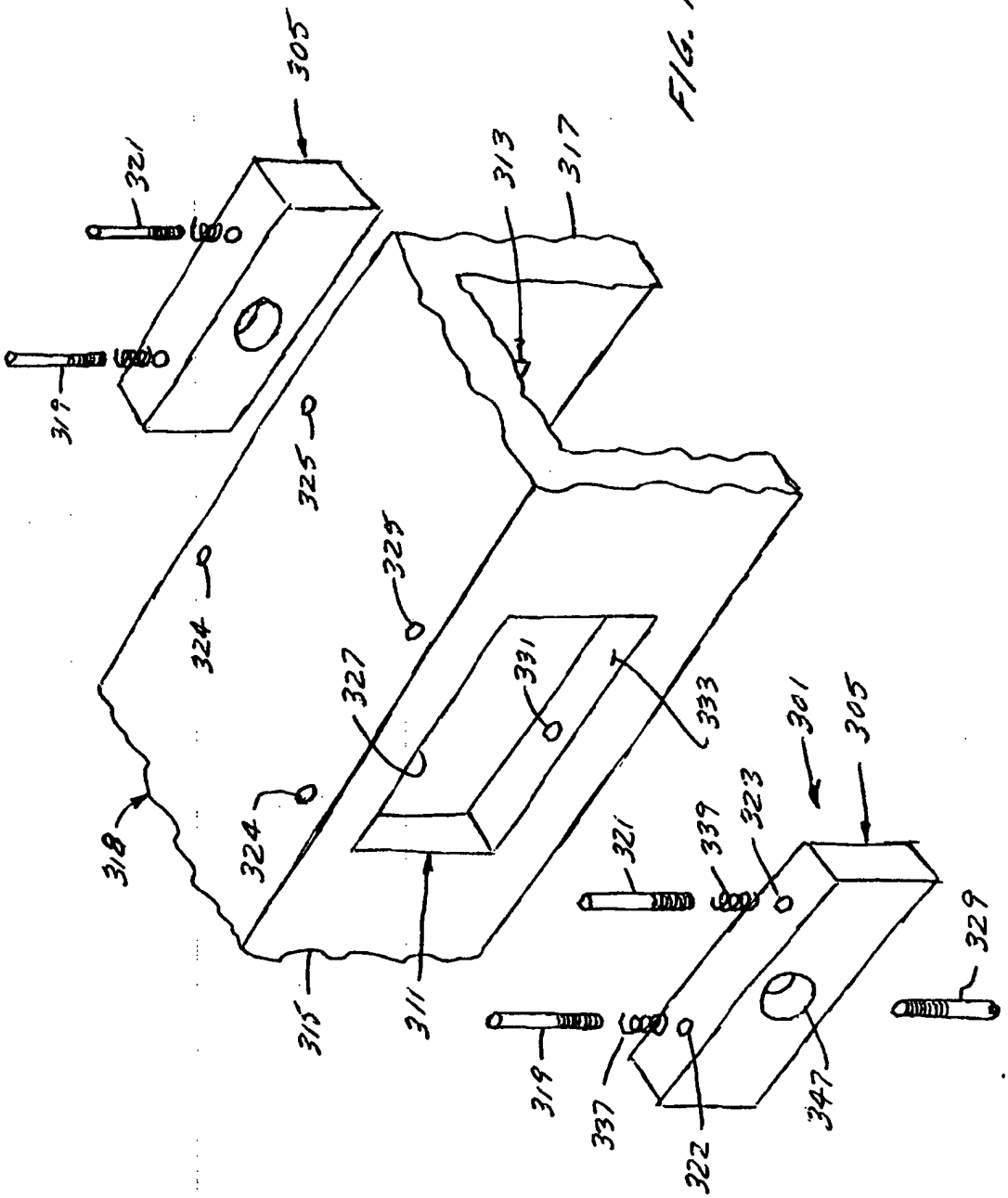

305
321
313
317
319
325
324
329
327
331
333
301
305
318
324
321
339
323
329
315
311
319
337
322
347

FIG. 10

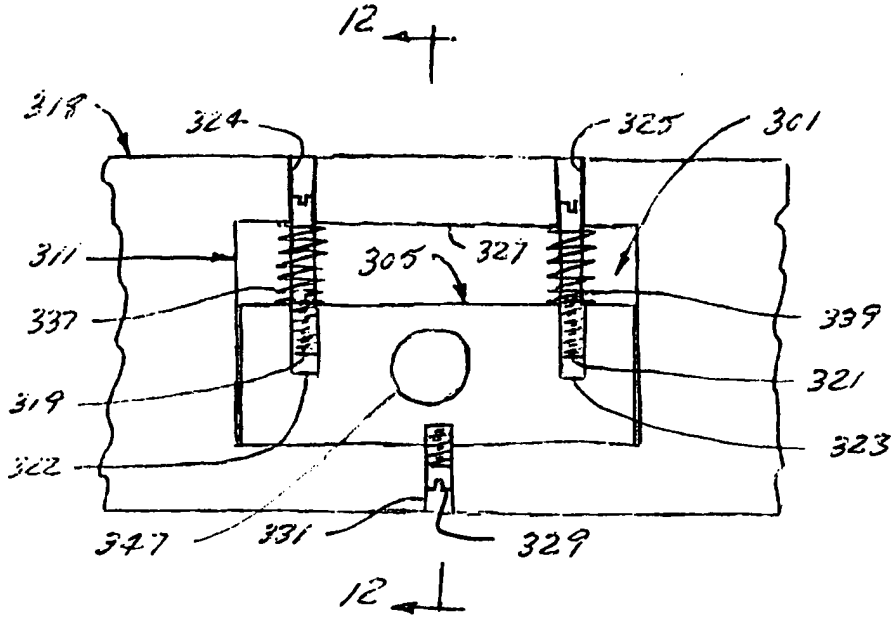

12
318
324
325
301
311
305
327
337
339
321
319
323
322
347
331
329
12

FIG. 11

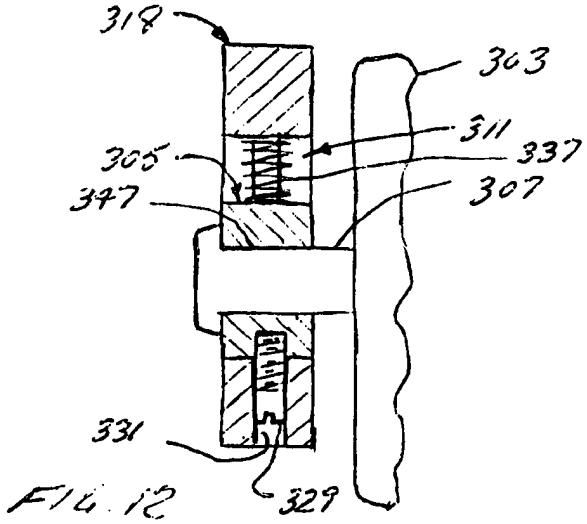
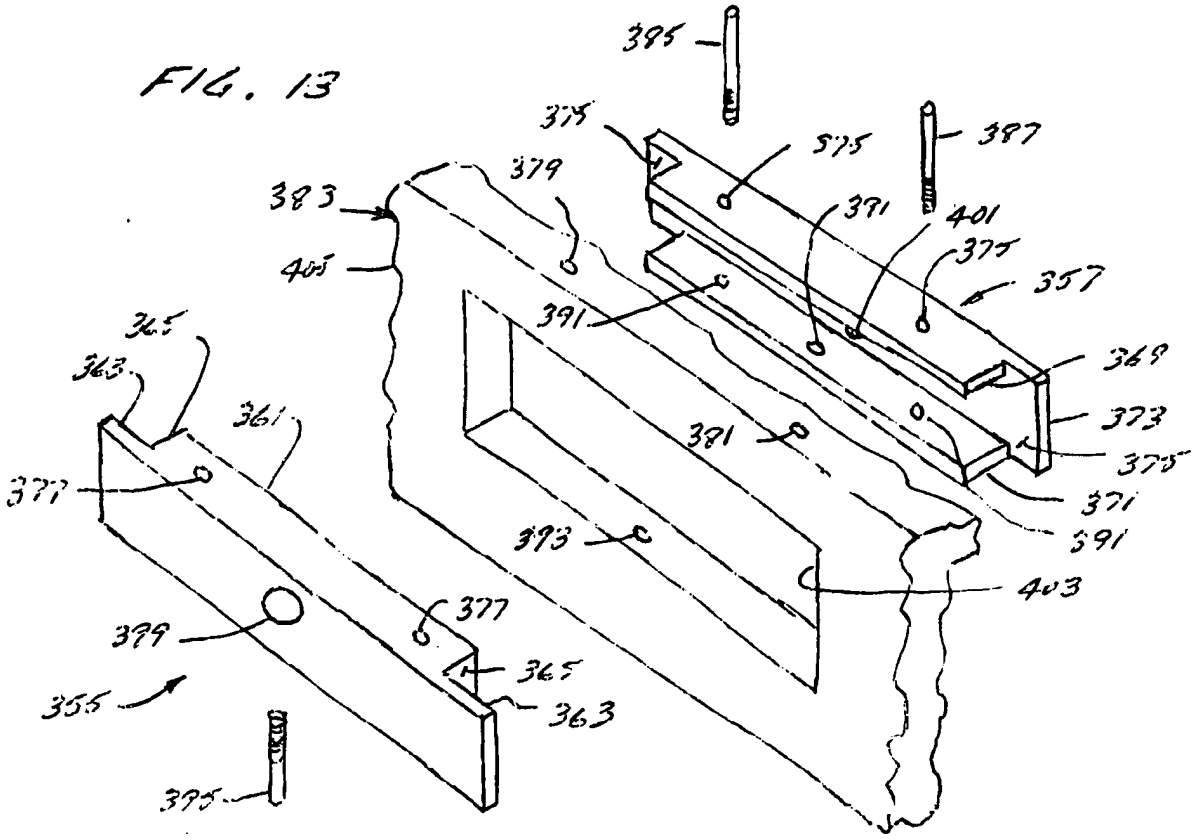

318
303
311
337
305
307
347
331
329

FIG. 12

FIG. 13


385
375
387
379
383
375
391
401
405
357
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393
403
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365
355
363
395

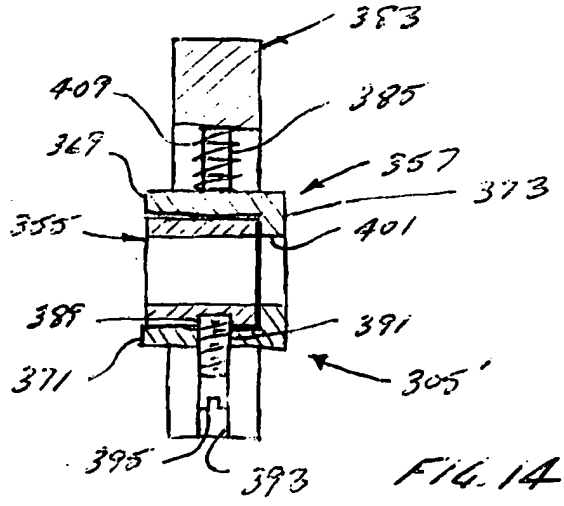
383
409
385
367
357
373
355
401
387
391
371
305'
395
393

FIG. 14